SUBJ: ENVIRONMENTAL WATER SAMPLING REVIEW AT NAVAL BASE KISTAP

REF: (a) Illicit Discharge Detection and Elimination (draft), Naval Base Kitsap Bremerton, 2016
(b) Illicit Discharge Detection and Elimination: A guidance Manual for Program Development and Technical Assessments, EPA Center for Watershed Protection and Robert Pitt University of Alabama, October 2004

1. During the deep dive into the improper waste water connection at PSNS, environmental monitoring efforts along the Naval Base Kitsap Bremerton waterfront were also reviewed. This memorandum serves to outline monitoring processes that have been in-place, recently-implemented changes, and efforts toward improved future monitoring capabilities.

Monitoring for illicit domestic waste water releases in Bremerton has been done on a voluntary basis by PSNS&IMF to collect data for anticipated future waste water permit negotiations. Additionally, Public Works Department Kitsap (PWD) has a program to actively seek illicit discharges. Since the 2018 discharge events, procedural changes have been made to the program to require immediate notification to leadership and to immediately initiate a comprehensive investigative process upon discovery of initial indicators of a possible release. From discussion with multiple local jurisdictions, none of the consulted entities have a continuous monitoring system capability in their storm water system. However, PWD continues to engage the Environmental Protection Agency and vendors of monitoring equipment, and we are pursuing promising leads that may result in continuous monitoring capability pilot projects at NBK.

2. Current monitoring program: The storm water system for NBK Bremerton/PSNS discharges storm water from the heavily industrialized area into Sinclair Inlet and consists of approximately 136,000 linear feet (26 miles) of collection lines with pipe diameters ranging from four inches to 54 inches. There are 1,807 grated (non-rail) drain inlets and 2,389 grated (rail) drain inlets, along with 18 oil/water separators and 156 outfalls into Sinclair Inlet. In addition to the 156 outfalls, there are approximately 1,043 catch basins or track drains on piers that drain directly to Sinclair Inlet. Some storm water from the City of Bremerton also drains through the Navy storm water system.

Marine water quality monitoring at NBK Bremerton/PSNS has been accomplished by PSNS&IMF since 2002 as part of Project ENVironmental InVEStment (ENVVEST). Although the project expired in 2016, PSNS&IMF continues to perform voluntary monthly near shore fecal coliform (FC) sampling in an effort to assess the overall health of Sinclair Inlet, determine water quality trends, and have data for discussions with the regulatory community for development of a new discharge permit. Sinclair Inlet is presently identified as Category 2, (Waters of Concern, Not Known to Be Impaired) for FC, based on data from 2008. There is no regulatory requirement to perform the sampling, nor does PSNS&IMF provide water quality monitoring data to the Department of Ecology. The Navy is authorized to discharge directly into Sinclair Inlet by an Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Permit WA-000206-2a, issued to PSNS&IMF. The permit authorizes specific point-source discharges, including storm water runoff, non-contact cooling water from vessels in drydock, treated waste water from the steam plant, potable water, steam condensate, saltwater supply, and demineralized water. The EPA prohibits any discharge not

specifically authorized by the NPDES Permit. The permit also sets thresholds for reportable discharges. Any spill of domestic waste water that exceeds 100 gallons in a 24-hour period must be reported within 24 hours of discovery.

PSNS&IMF perform FC sampling at 22 locations which are near major NBK Bremerton/PSNS outfalls, heads of piers, and in the center of Sinclair Inlet (see Figure 1). The samples are analyzed by Centric Labs in Port Orchard and results can take up to five working days to be returned. Ongoing monitoring of Sinclair Inlet and Dyes Inlet is also conducted by Kitsap County Health District, Washington Department of Health, and Kitsap County Surface and Storm Water Management program.

3. Illicit Discharge Detection and Elimination program: In 2016 the NBK Environmental Office (EV) developed and implemented a draft IDDE Manual (ref (a)) for NBK Bremerton in anticipation of an IDDE Program becoming a requirement of a new Municipal Separate Storm Sewer System (MS4) permit. The purpose of the IDDE program is to maintain an ongoing effort to detect and remove illicit discharges to the storm water system. EPA has not yet issued a MS4 permit for NBK Bremerton (or any Navy facility in the Northwest), but the IDDE Manual is fully implemented.

The IDDE process involves performing inspections of storm drains to identify potential illicit discharges through observation of flow where none should be expected, unusual odor, discoloration of water, presence of solid materials or suds, and FC testing. The IDDE program is only implemented during the dry season (July-August) due to the dilution of rainwater masking illicit discharge during wetter months of the year. Suspected illicit discharges are investigated jointly by NBK EV and PWD Production Shops, using techniques such as mapping possible sources, visual inspection, and dye testing. Investigation results are reported and recorded in accordance with ref (a), SOP-8 (Record Keeping). PWD Shops, PWD Utilities, and Facilities Service Contracts Management & Facility Services are notified to determine if current projects could be responsible for high fecal coliform sample results.

A result of learning from recent discharges, new draft procedures are in place to aggressively identify potential issues and track them upstream in the storm water infrastructure. If the results of water quality sampling identify a high nearshore FC sample, a follow-up sample is taken as soon as practical but no later than five business days in accordance with ref (a), SOP-2 (Fecal Coliform Grab Sampling and Analysis). The follow-up sample is taken at the nearest outfall and in the first non-tidally influenced manhole upstream of the original sample site. Simultaneous with follow-up sampling efforts, PWD initiates multi-division investigation of the drainage area to locate a possible source. Additional water sampling and investigations of the storm water system are conducted in the event that laboratory analysis are above action levels below:

Fecal coliform concentration decision criteria:
For marine waters: >65cfu/100mL
For storm water manhole: >1000cfu/100mL (higher due to bacterial contamination common in storm water piping)

5. Other jurisdictions' processes: The IDDE programs for the City of Seattle and Kitsap County are very similar to the Navy's in terms of monitoring and investigation for suspected discharges. Each of these jurisdictions monitors the storm water system during the dry season to

identify sources outside storm runoff. Each jurisdiction's program uses visual observations, with field and laboratory testing, to help identify potential discharges and sources. Specific laboratory analysis is similar among the jurisdictions with slight difference to account for specific contaminates that would be suspected of entering the respective storm water system. (For example, the City of Seattle adds fluoride to drinking water so the chemical would be a good indicator of an illicit discharge; Bremerton does not add fluoride, therefore the chemical is not tested.) All of the local utilities we consulted - Kitsap County and the cities of Bainbridge, Port Orchard, Bremerton, and Seattle - investigate suspected sources by collecting water samples, performing dye testing, and conducting subsurface investigations, which aligns with Navy response protocol.

6. Communication process: Considerable improvements occurred in NBK-PSNS communication paths and processes from development after the August event to implementation in the September event. Figure 2 lays out a draft flow chart that PWD is staffing with stakeholders. Upon indicator(s) of a suspected discharge, a formal and coordinated response is initiated. Within one hour the Waste Water Team, composed of individuals from PWD Kitsap (PWO, APWO, Shops and Environmental), Code 106, NBK Public Affairs Office, and FEAD (if applicable) are informed. Departments begin conducting investigations to identify a possible source. If the source is identified, the team focuses first on stopping the flow from discharging into Sinclair Inlet and then rendering repairs. The Team will hold regular briefings as necessary to exchange information on the release, estimate rate and volume released, and a narrative generated for use in communication with the regulatory, tribal, and public audiences. These processes are drafted for inclusion in a new NBK instruction and were "field-tested" successfully during the most recent event.

7. Technology/improved capability research: The 2018 waste water releases at Bangor, Keyport, and Bremerton show that more timely detection of releases is necessary, even if not required by federal or state regulations. The present process involves manual sampling and analysis by an accredited laboratory (involves preparing the sample and counting fecal coliform colonies under a microscope). The process does not distinguish between fecal coliform from human sources or non-human sources, such as animal waste. A continuing investigation seeks techniques/technologies to provide more timely, repeatable, and human-source-sensitive results. The investigation included discussions with the City of Bremerton, City of Port Orchard, Kitsap Health District, Kitsap County, Washington Department of Ecology, the Environmental Protection Agency's Manchester Laboratory, and a Florida Laboratory. Our investigation led to the below conclusions:

a. Ammonia, a byproduct from the breakdown of fecal material, has been found to be an excellent field parameter for the presence of waste water entering storm water. Reference (b) reports an >80% correlation in the identification of waste water entering the storm water system. Other indicators, such as pH and phosphorus, were not found to be reliable indicators of contamination. PWD continues researching a commercially-available product that could provide real-time detection of ammonia as an indicator. Reference (b) indicates waste water in storm water ammonia is detectable at a concentration for which PWD has not yet identified a vendor with equipment sufficiently sensitive for early detection. Though technological limitations need to be addressed, we are researching pilot opportunities at NBK.

b. Identifying if an elevated fecal coliform sample is human in origin would help identify a positive discharge more rapidly than our current capabilities allow. Source Molecular Corporation of Miami, Florida is able to run DNA tests on fecal coliform samples to determine if the source is human or non-human. Standard turnaround time is 5-10 business days and does not provide the rapid response desired, so PWD continues to seek a local laboratory that could perform similar analyses. The EPA Region 10 Laboratory at Manchester advertises on their website that they have the capability to use polymerase chain reaction (PCR)-based methods to differentiate between human and ruminant fecal contamination. PWD will continue to pursue this source for its potential in local sample analysis in lieu of the Florida option.

c. As the Navy's Center of Excellence for facility and environmental, PWD has contacted NAVFAC Expeditionary Warfare Center to assist in researching methods to provide continuous monitoring for indicators of waste water presence.

8. In summary, PWD Kitsap's investigation included discussions with the City of Bremerton, City of Port Orchard, Kitsap Health District, Kitsap County, Washington Department of Ecology, the Environmental Protection Agency's Manchester Laboratory, and a Florida Laboratory. Resulting from this deep dive the following actions are underway:

- New NBK instruction to formalize
    - New follow-up sampling process to speed response
    - New communication process
- Find a vendor with ammonia monitoring technology for a pilot on NBK
- Continued discussion with regulators and adjacent utility jurisdictions
- IDDE refinements

This deep dive into the environmental monitoring program at NBK/PSNS has improved response, heightened awareness of discharges, and opened opportunities to implement capabilities that may provide early warning capability to avoid illicit discharges. I intend to continue researching the promising leads this deep dive yielded and provide a brief in mid-November on a draft instruction, technology update, and collaboration with other utility jurisdictions.

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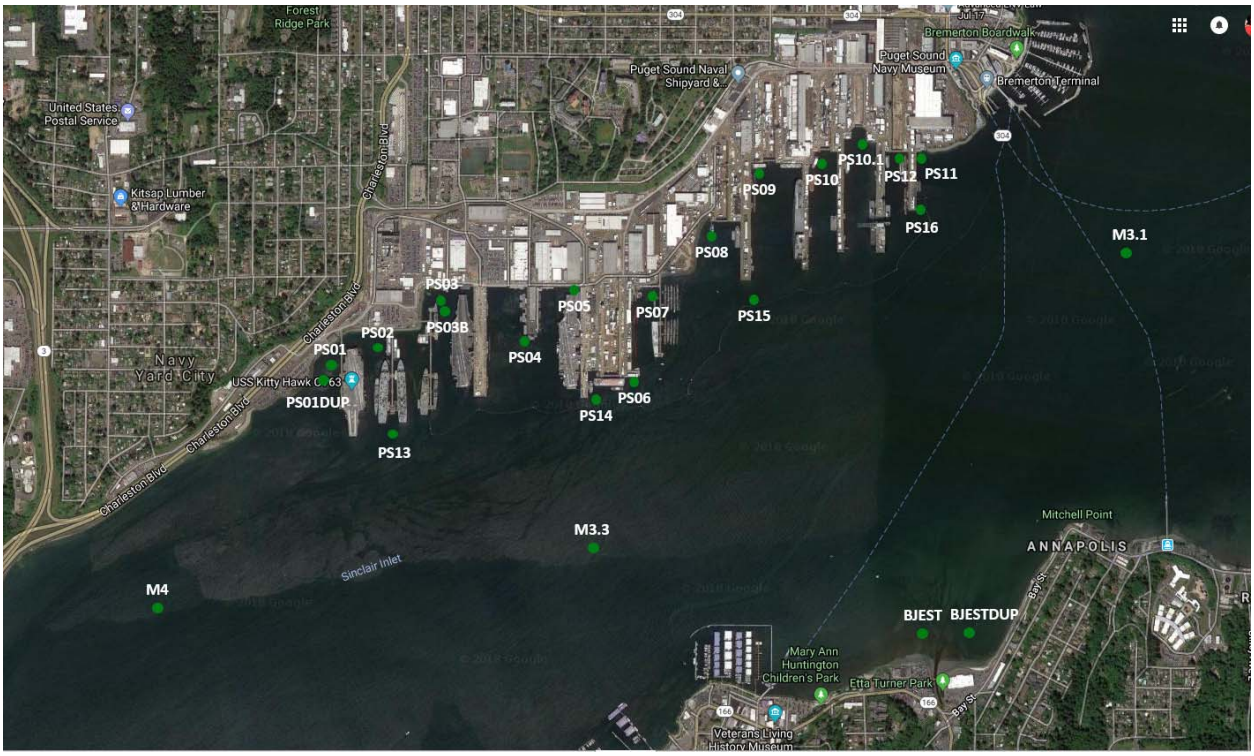
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United States Postal Service
Kitsap Lumber & Hardware
Charleston Blvd
Navy Yard City
USS Kitty Hawk (CV-63)
Puget Sound Naval Shipyard &...
Bremerton Boardwalk
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PS04
PS01DUP
PS06
PS14
PS13
M3.3
Mitchell Point
ANNAPOLIS
Sinclair Inlet
M4
BJEST
BJESTDUP
Mary Ann Huntington Children's Park
Etta Turner Park
Veterans Living History Museum
Bay St

Figure 1.

COMMUNICAITON FLOWCHART FOR DOMESTIC WASTE WATER RELEASES NBK-BREMERTON

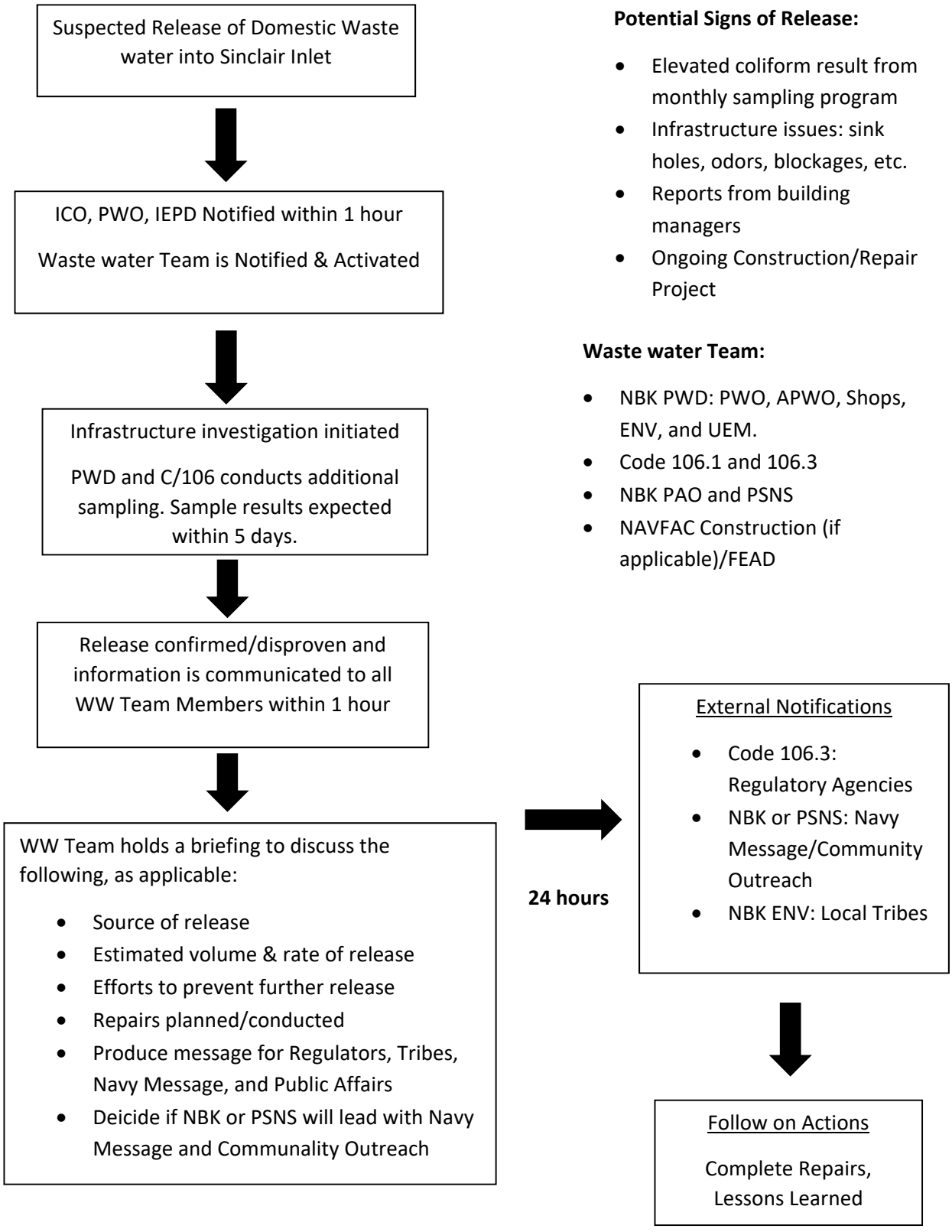

Figure 2.